Critical Changes: California's Energy Future





Pete Wilson, Governor

VISION FOR CALIFORNIA

Californians will have energy choices that are affordable, reliable, diverse, safe and environmentally acceptable. State government assesses, advocates and acts through public-private partnerships to improve energy systems that promote a strong economy and a healthy environment.

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IN 1974, the California Legislature established the California Energy Commission as the state's primary energy policy-making agency to address the energy challenges facing our state. The Energy Commission was given and retains the responsibility for ensuring California has a reliable supply of energy consistent with protecting the state's environment, public health and safety, and with enhancing the economy.

The Energy Commission prepares a State Energy Plan, commonly called the Biennial Report, which identifies the emerging trends related to energy supply, demand, conservation, public health and safety, and the maintenance of a healthy economy. Adopted by the Energy Commission, and approved by Governor Pete Wilson, this report is the official *California Energy Plan*.

During the course of this proceeding and the development of this *California Energy Plan*, several actions affecting the energy industry have occurred. The most significant of these activities was the passage of Assembly Bill 1890 (Brulte) in September 1996 (Chapter 854, Statutes of 1996). This report rests on the public record in the State Energy Plan proceeding and the extensive public record developed in the California Public Utilities Commission's electricity industry restructuring proceeding. In addition, the public records developed for the Energy Commission's Electricity Report and Fuels Report also were used for input.

GOVERNOR PETE WILSON



Dear Fellow Californians:

California is the gateway to the new millennium – a state rich in diversity and vitality of its people, natural resources and energy. During the last seven years, we have built a world class economy, fueled by the most diverse and efficiently-generated energy supplies in the world, while holding fast to a strong environmental ethic which preserves the health and beauty of our state.

California's lasting energy legacy is one of accurate and independent information on future energy supplies, prices and demand, government alliances with the business communities promoting energy efficiencies and exportable energy products, an unwavering pursuit of new technologies and achieving competition in our energy markets. Competition no longer ends with petroleum and natural gas. Beginning this year, California consumers will have choices in their electricity suppliers as we become the first state to bring competition to the largest combined private electric utilities in the world.

I had the honor of signing the Electricity Industry Restructuring Act (AB 1890) into law in September 1996. This monumental bill provides the framework for lower generation costs, and for the first time, the ability for customers of the state's investor-owned utilities to choose their electricity provider.

The California Energy Plan, our state's energy policy, recognizes that leadership, consensus and commitment are key to an aggressive and effective state energy policy. The heart of this plan upholds California's long-standing commitment to environmental quality, economic vitality, and protection of the public interest through technological advancements. It outlines strategies to build on competition in all energy-related markets and addresses the state's complex transportation problems.

The plan acknowledges that government bureaucracy must change the way it conducts business by streamlining the energy facilities licensing process, consolidating duplicative state energy-related services, and ensuring that government provides consumers only those services not adequately provided by competitive markets.

While California's energy successes are truly global in their scale, we must continue our efforts to build a reliable, secure and environmentally balanced energy network. The California Energy Plan provides a policy framework to meet the energy challenges of the next century and maintain California's rightful place as the front-runner in energy development and technologies.

Sincerely,

Put Vilem





California's vitality depends on a reliable, efficient and affordable supply of energy used efficiently.

EXECUTIVE SUMMARY

Over the last 20 years, energy systems and services have expanded. California now meets its energy needs using a variety of sources from traditional fossil fuels and nuclear technologies to renewable energy resources, such as wind, solar, geothermal and biomass. Technological advances and government standards and programs have resulted in increased energy efficiency, more product and service options and a cleaner environment. Deregulation has promoted competition in energy commodities such as oil, natural gas and, now, electricity.

In the near term, the most dramatic changes in the energy sector are taking place in the electricity industry. As a result of Assembly Bill 1890 (Chapter 854, Statutes of 1996), many Californians will have the opportunity to choose their electricity provider as of April 1, 1998. By January 1, 1999, they will also be able to shop for other electric services, such as metering options. Because of these changes, this *California Energy Plan* emphasizes the new competition in electricity generation, in contrast to the discussion of issues in the petroleum and natural gas sectors. However, future state energy policy may emphasize other sectors.

competitive energy markets. California's energy oversight agencies must facilitate competition to ensure that the promise of lower prices and more value-added services are realized. This can be achieved through adoption and enforcement of fair, clear and effective market rules and by ensuring that consumers are provided with sufficient information to make informed energy-related decisions. Government must also reduce unnecessary barriers to market entry and streamline the licensing process for electric generation facilities.

economic EXPANSION. California has one of the largest economies in the world. Consequently, California's economy must be robust in the face of uncertainty, providing for economic growth in conjunction with environmental protection for today and for future generations. Maintaining the energy needs of today's economy requires vast quantities of reliable energy at reasonable prices. To maintain or expand California's preeminence as a world class economy requires technological advancements that enhance productivity and improve the environment.

Advancements will make California a

GLOBAL LEADER IN THE WORLD MARKET

PLACE FOR ENERGY TECHNOLOGIES WHILE

BENEFITING ALL CALIFORNIANS.

In the energy industry, technological advancement must focus on increasing demand and supply side efficiencies, improving the environment by creating cleaner energy conversion technologies at all levels of energy production and end use, and satisfying California's mobility requirements through diverse transportation technologies that increase fuel economy, take advantage of cleaner fuels and expand transportation options. Advancements in these areas, among others, will make California a global leader in the world marketplace for energy technologies while benefiting all Californians.

PUBLIC INTEREST. Competition does not provide all the answers to California's needs. Unlike certain commodities, energy is essential for the health and safety of all Californians. Thus, the state must ensure that the energy infrastructure is safe, clean and reliable. The public interest also demands that energy be available for home, work, recreation and transportation. Communities can help meet these public interest demands through efficient land use designs that reduce total energy demand and the adverse environmental impacts of energy use. California's energy oversight agencies must continue to work together to avoid, where possible, disruptions to the state's energy supplies and to minimize any adverse impacts.

To serve the public interest, government will continue to have varying levels of regulatory oversight of the energy industry. The electricity transmission and distribution systems will continue to be fully regulated monopoly services to ensure system safety, reliability and sufficiency. Rate design principles for monopoly services, however, must be crafted to reward utility efficiency without subsidizing competitive service offerings. Government will also remain responsible for emergency planning and enforcement of existing environmental laws applicable to energy facilities.

In other areas, government must evolve to complement and facilitate competition. This will include programs to assist providers of energy efficiency services and renewable energy providers to compete with other energy providers without government subsidies. Although state energy agencies will continue to collect and analyze energy-related information, this information will be used for policy development, consumer education and protection, and energy market monitoring. State programs designed to increase energy efficiency are transforming from subsidy- or mandate-based to market-based.





California is expanding energy choices for consumers, including alternative fueled vehicles (e.g., a natural gas powered Ford truck) and the Power Exchange's open auction for electricity buyers and sellers.

ENERGY RISK MANAGEMENT. California has long advocated diversifying its energy resource base as a means to address the risks of supply disruptions or price volatility of a single fuel. For example, the transportation sector currently relies on petroleum products to meet nearly all its energy needs. Fuel supply problems and price volatility pose risks to consumers and to the state's economy.

Adopting strategies to encourage alternative fuels allows consumers and the state greater flexibility in risk management efforts. Such strategies can include improving the efficiency of fuels used, developing different fuels and technologies, and requiring that all fuels meet or exceed the same environmental and performance levels. As the transportation sector diversifies the fuels used and improves fuel efficiency, adverse impacts on the system as a whole can be mitigated.

Government can partner with industry to lower costs, improve availability and remove technology constraints to encourage greater use of alternative fuels and technologies. Educating customers about the benefits of alternatives can significantly assist in greater use.

This California Energy Plan lays out the energy issues facing California in the years ahead and what state government can do to respond to them, with emphasis on the changes in the electricity sector. Part I of this report briefly describes the major issues within seven energy-related government functions and recommends responsive policies and strategies. Part II describes the State's energy system, including a discussion of electricity industry restructuring, the anticipated growth in energy demand, the future supply of petroleum and natural gas, and transportation-related issues.

The strategies contained in this report touch on all the state's energy-related functions and programs. Coordinated efforts among the agencies responsible for energy oversight in the state will be required to implement these strategies.







". . . ACHIEVING THE ECONOMIC BENEFITS OF

INDUSTRY RESTRUCTURING . . . COMPETITION,

LOW COST AND RELIABLE ELECTRIC SERVICE."

ASSEMBLY BILL 1890 (CHAPTER. 854, STATUTES OF 1996)



COMPETITIVE ENERGY MARKETS – GOVERNMENT'S ROLE

RESTRUCTURING – Competition holds the potential for lower prices and more choices for energy consumers beyond those that can be obtained through continued monopoly provision and regulation of energy services. Petroleum, natural gas and electricity markets have been evolving away from pricing controls and toward competition for more than two decades. For a market to function well, however, producers and consumers need rules that are equitable, clear and enforceable.

LEGISLATION – Assembly Bill 1890 (Chapter 854, Statutes of 1996) is one of the more recent in a series of federal and state legislative initiatives to increase competition in electricity and natural gas markets. Many interest groups continue to work with government to clarify market structures and determine appropriate roles and activities for the public and private sectors. Efforts have focused on market oversight; system reliability; efficiency; research, development and demonstration (RD&D); renewable resources; and on the information needs of energy markets, government and consumers.

COMPETITION – Allowing competitive supply of energy products and services can lower the cost of basic services. It will also increase the number and variety of value-added options through technological innovation. To achieve these benefits, both state and federal governments must continue to facilitate the development of competitive markets by removing barriers (e.g., market power abuses, lack of accurate, readily available information, unnecessary regulatory requirements, and infrastructure constraints) and ensuring that consumers have sufficient information to make wise energy-related decisions.

TRANSITION – During the next four years, state and federal agencies will monitor the new electricity market's development. They will measure outcomes and assess the need for changes to market rules and conditions to achieve fair and efficient market operation. As government better defines the roles and responsibilities of the public and private sectors, uncertainty will be reduced. The state's role in the electricity sector will transition to overseeing markets, protecting consumers, ensuring system reliability, informing market participants, providing



The Independent System

Operator coordinates

electricity scheduling and
generation dispatch.

environmental safeguards, and continuing to develop energy policy. The Federal Energy Regulatory Commission (FERC), the Energy Commission, the California Public Utilities Commission (CPUC), the Legislature and the newly created Electricity Oversight Board must work together to ensure an orderly transition to a more competitive electricity market.

California has a long-standing commitment to improve energy efficiency and promote advanced energy-related technologies. During the transition period (1998-2002), AB 1890 ensures that electricity-related "public purpose programs" such as efficiency improvements and RD&D will have adequate funding. In addition, \$540 million will be used over the next four years to assist renewable energy providers become more competitive. One of the goals of this effort is to assist the renewable energy industry in becoming self-sufficient, without ratepayer subsidies, after the transition period.

ISSUES/NEEDS

- What barriers can government reduce or eliminate to facilitate the development of competitive energy markets while protecting the public interest?
- What information will decision-makers need to monitor the development of energy markets and achieve the goals of competition?
- How can government fulfill its role to provide consumer and environmental protection, monitor energy markets, ensure operational reliability, and supply needed information not available in the market?

POLICY: Remove barriers, as appropriate, to allow the development and continued evolution of competitive energy markets which maximize consumer choice.

- Develop and recommend equitable, clear and consistent rules for energy markets to the Legislature and Governor.
 State energy agencies will coordinate with the Legislature, Governor and the FERC to ensure their implementation.
- Monitor the development of energy markets and recommend to the Legislature or appropriate regulatory agency means to eliminate barriers to market benefits of lower costs and more value-added services.
- Establish minimum safety, reliability and service criteria for the electric system. Develop means for customers to resolve complaints and disputes with energy providers.
- Encourage meaningful consumer choice in the marketplace by providing educational materials and services that include sufficient information to differentiate the value of energy products and to protect against misinformation.
- Provide accurate and comprehensive energy-related information not readily available in the marketplace that identifies trends and assists in resolving long-term energy issues. This information may include environmental impacts, the potential for increased efficiency, life-cycle costs and availability of alternatives.
- Implement AB 1890's Renewables Program to move renewable technologies toward a sustainable market.
 Develop evaluation criteria to monitor progress and identify barriers to achieving the program's objectives.
- Implement SB 1305 (Chapter 796, Statutes of 1997) by
 ensuring that consumers have access to accurate information about fuel sources used by electricity providers and
 options to choose more environmentally beneficial energy
 products and services.
- Establish rates for remaining monopoly services that provide incentives for increasing utility efficiency, but do not subsidize competitive services.
- Beginning now, systematically review all energy-related statutes and recommend to the Governor and Legislature statutory changes to remove unnecessary regulatory requirements and to implement the above strategies.

ENERGY DEMAND WILL CONTINUE TO

RISE AS CALIFORNIA'S POPULATION GROWS

AND THE NEED FOR SERVICES INCREASES.



SUPPLY AND DEMAND ASSESSMENT

WHAT WE KNOW – Energy demand will continue to rise as California's population grows and the need for services increases. California depends on petroleum, natural gas, and electricity provided via a regional, integrated infrastructure that allows access to resources throughout the West, Alaska, Canada and Mexico. Electricity is generated from fossil fuels, nuclear and renewable resources. Energy supplies are subject to various levels of uncertainty – ranging from the effects of international pressures on oil and natural gas prices to market behavior under electricity industry restructuring.

To anticipate the need for additional natural gas and electricity supplies, the Energy Commission develops forecasts of long-term energy demand, taking into consideration the effects of improved efficiency and technologies. The Energy Commission also monitors the activities of California's petroleum market, with special concern for the reliable supply of reformulated transportation fuels. This information has helped to ensure that system expansions and improvements are made before supply problems arise by sending signals to developers and investors. While California's energy demand continues to be met, the state has worked to reduce the

environmental impacts resulting from the production, conversion and consumption of energy for transportation, electricity generation, and commercial and residential use.

UNFORESEEN DISRUPTIONS – Despite these forecasts, unforeseen disruptions in the supply of fuels and electricity still do occur. These disruptions, from either man-made or natural events, even when minor, can cause large economic losses and affect our way of life. Consequently, the Energy Commission, in cooperation with other agencies, has developed and maintains the state's energy emergency response plan to mitigate the impacts of any disruption.

NEW ROLE – In the past, state and federal agencies had various levels of control over energy pricing and resource development. The Energy Commission influenced the timing and type of electricity resource additions to meet the forecasted demand for electricity. As the new electricity market matures, the state's role in regulating the electricity industry will change. State government will no longer set electricity generation rates.





California relies on energy resources from throughout the West, Alaska, Canada and Mexico.

During the transition to more competitive electricity markets, the Energy Commission, the Electricity Oversight Board and CPUC, in conjunction with the Independent System Operator, Power Exchange and their governing boards, will monitor the development of the market. This information will be provided to decision-makers to allow them to make appropriate adjustments during the transition. The Energy Commission will support the transmission planning activities of the Independent System Operator by performing transmission system analysis.

In the long run, the Energy Commission anticipates that impartial analyses and information on energy resources, services, products and market conditions will be useful to market participants. In addition, the Legislature, Governor and state agencies will use this information to guide energy policy development and support consumer and environmental protection.

ISSUES/NEEDS

- How will government determine if adequate, affordable and reliable energy supplies are available to meet demand in a competitive market?
- How will government continue to accommodate resource supply development while continuing to improve environmental quality?

POLICY: Ensure decision-makers have the most current and comprehensive information on the adequacy and reliability of energy resources available to meet California's long-term consumer demand.

- Monitor the demand for and supply of petroleum, natural gas and electricity in the interest of Californians.
- Monitor the reliability of refinery production of Californiaspecific reformulated gasoline and diesel fuel, providing information on price and supply, including short-term fluctuations.
- Evaluate the potential for adverse environmental and economic impacts of increased imports of transportation fuels and, as needed, recommend measures that will mitigate any adverse impacts.
- Revise the state's energy data collection and confidentiality regulations consistent with the findings from the Energy Commission's Information Rulemaking and Investigation proceeding.
- Coordinate regional energy information maintained by state agencies with other public and private energy partners to ensure timely flow of accurate energy supply and demand data.
- As needed, re-evaluate and modify the state's energy
 emergency response plan. Continue to maintain a high level
 of readiness to respond quickly and cooperatively to any
 event that may cause an energy supply disruption. Identify
 and seek innovative solutions which reduce the risks of
 disruptions.

CONSUMERS MUST HAVE ACCESS TO

CREDIBLE AND RELIABLE INFORMATION ON

THE COSTS AND BENEFITS OF ENERGY

EFFICIENT PRODUCTS AND SERVICES.



ENERGY CONSERVATION AND EFFICIENCY

CHANGES – Energy conservation and efficiency are tools to achieve lower costs, reduce adverse environmental consequences, improve productivity and provide greater value to consumers. Policies directing conservation and efficiency programs over the past 20 years have changed from "use less fuel" to "use energy more effectively." During this period, government programs regulated energy use through standards and prohibitions to reduce energy consumption. State and federal programs also influenced energy products and services that consumers purchased through such economic incentives as rebates and subsidies. Despite these efforts, many available energy efficient products still are not in widespread use today. To remove barriers that hinder the use of these products, the state is taking a new approach to efficiency and conservation by developing a consumer-driven market for these products and services.

INFORMATION AND EDUCATION ARE THE KEYS -

Consumers can better differentiate between the value of buildings, appliances and energy services if they are aware of their energy attributes and how the state's minimum efficiency standards affect them. Both vendors and government will share in providing this information. The state is currently revising its building efficiency standards to make them more understandable to builders and consumers. Educating consumers about the long-term benefits of their purchases may affect their choice of products. Encouraging the introduction of new, more efficient products into the marketplace will expand the options available to customers. It is expected that both efforts will affect long-term consumer behavior, thus increasing the demand for cost-effective, efficient products and services.

NEW FRAMEWORK – The California Board for Energy Efficiency, created by the CPUC, will oversee the establishment of a new framework for efficiency programs based on measurable, clear criteria to determine progress and generate credible information about products and services. The goal of these programs is to facilitate sustainable changes in the energy services market that favor the voluntary adoption of more efficient products and services. Energy service companies must have the opportunity to compete and provide consumers with the products and services that best meet their needs. To realize these goals, consumers must have access to credible and reliable information on the costs and benefits of energy efficient products and services.



Energy efficiency can lower long-term costs, increase environmental quality and improve operations.

REMOVING BARRIERS – Barriers to increased efficiency, including higher up-front costs and the lack of information, contribute to the gap between potential savings and realized savings. These barriers must be overcome to achieve a viable energy efficiency market in the future. Focusing on ways that government can assist in removing these adverse market barriers will guide the reorganization of remaining government-sponsored energy efficiency programs.

Lack of coordination between state efficiency programs can also be a barrier. To assist potential clients and increase the effectiveness of public dollars, state agencies need to better coordinate and minimize the administrative costs of these programs. Working together, agencies can better target sectors with the greatest potential for increased energy efficiency.

ISSUES/NEEDS

- How can government best assist the market to improve efficient energy use?
- What market and regulatory barriers must be removed to allow greater penetration of energy efficient technologies in the marketplace?
- What is government's role beyond the transition period in developing a demand for cost-effective energy efficient products and services?

POLICY: Facilitate the economic, efficient, effective and environmentally responsible use of all forms of energy by California's citizens and market participants.

- Identify and remove market and regulatory barriers to costeffective energy efficient products and services, including those in the transportation sector.
- Re-evaluate current efficiency programs and establish
 measurable evaluation and monitoring criteria for markettransforming results that will be sustainable after government programs have been phased out. Refocus publicly
 funded programs to end-use sectors with the greatest
 potential for energy efficiency gains.
- Establish a clearinghouse of state energy efficiency and conservation programs for electricity and natural gas and conduct outreach to potential users. State agencies involved in efficiency will coordinate efficiency programs with national, regional and local efforts.
- Simplify energy-related building standards and regulations to increase public understanding and industry compliance.
- Evaluate energy efficiency services and products, and develop information and education materials to provide consumers with tools needed to better understand available options. Develop and distribute energy efficiency-related curriculum for all grade levels and provide training services for the building industry, local officials, industrial, commercial and agricultural sectors and water agencies.
- Support efforts by federal agencies to implement costeffective, energy-saving appliance standards.
- State government should improve the efficiency of the buildings it constructs and occupies.

CURRENT ENERGY FACILITY

LICENSING PROGRAMS IN

THE STATE ARE FRAGMENTED.



STATE PERMITTING AUTHORITY

BALANCING NEEDS – Investors are expected to build new energy-related facilities in the future to meet growing demand and reliability requirements. At the same time, California must continue to improve environmental quality, ensure system reliability, protect public health and safety, and maintain a strong economy. Permitting and certification processes for power plants, pipelines and transmission lines must balance these public and private interests.

The permitting process requires information about the environmental consequences of various energy options and their impact on society. Effective state permitting processes consider local concerns and laws, ensure public participation, disclose impacts associated with energy facilities, and analyze mitigation options.

SPLIT OVERSIGHT AND REGULATORY AUTHORITY -

Current energy facility licensing programs in the state are fragmented. Lead agency authority is determined by ownership of the project, location or the type and size of the facility. The thresholds that determine state jurisdiction were established decades ago under different market, technology and supply conditions and may no longer be appropriate. This oversight structure has resulted in inconsistencies, redundancy and confusion. Some proposals have been made in recent years to consolidate and streamline these processes for the benefit of the public and developers. To date, these proposals have not yet been implemented.





State permitting activities
must ensure safe and clean
power plants and other
energy facilities in the
interest of all Californians.

LEVEL THE PLAYING FIELD – Under existing law, investorowned utilities and publicly-owned utilities have legal rights that independent power producers do not have. For example, investor-owned utilities and publicly-owned utilities can exercise eminent domain. With the advent of competition, the power of eminent domain should not be used for the development of competitive generation facilities. Instead, eminent domain should be used only for facilities critical to system reliability, as determined by an appropriate permitting agency. Other inconsistencies in the regulatory treatment of energy providers exist and must be identified and rectified.

ISSUES/NEEDS

- How will the power of eminent domain be used to develop future energy facilities?
- How must the state's licensing process change to facilitate fair competition among energy market players?
- How can the state make its permitting process more effective and equitable while protecting the public interest?

policy: California's energy agencies will foster public participation in the decision-making processes for development of energy facilities, ensuring compliance with applicable laws, ordinances, regulations and standards while balancing system reliability, environmental quality, and public health and safety.

- Consolidate and streamline authority for state
 permitting and compliance monitoring of energy
 facilities (power plants, transmission and distribution
 lines, pipelines and ancillary facilities) in a single state
 energy agency. Draft and enact legislation that
 authorizes the use of the power of eminent domain, as
 determined by the permitting agency, to develop
 transmission, distribution, and other energy facilities
 needed for system reliability.
- Re-evaluate the validity of current thresholds for state review of energy facilities, including thermal power plants, transmission lines and ancillary facilities.
- Continue to provide siting guidance to local jurisdictions for energy facilities, including fossil fuel pipelines, electric distribution lines and distributed generation systems. Disseminate information on methods to resolve issues associated with energy facilities and proven mitigation strategies.
- Develop creative regional solutions to transborder issues when state air and water quality are affected by energy projects near or adjacent to the state's borders.
 Specific to the California-Mexico border, the California Border Environmental Cooperation Committee is the appropriate forum.

RD&D HAS BENEFITED THE STATE'S

ECONOMY AND IMPROVED THE USE

OF NATURAL RESOURCES.



RESEARCH, DEVELOPMENT AND DEMONSTRATION

TECHNOLOGY ADVANCEMENT – Much of the improvement to California's energy infrastructure and the environment have come about through technological advancements. More efficient appliances, better construction practices for homes and buildings, diverse energy alternatives for transportation and electricity generation, and new environmental improvement strategies stem in part from state supported research, development and demonstration (RD&D). These efforts often provide insights to resolve issues in various energy and environmental areas outside the original scope of a project. RD&D has benefited the state's economy and improved the use of natural resources. (Romer, 1993 and Wilson, 1993)

REDEFINING AND REDIRECTING – It is in the state's best interest to have environmentally sound, safe, reliable and affordable energy services and products. AB 1890 designates that RD&D activities serving a broad public interest should not be lost in the transition to a more competitive electricity industry. AB 1890 defines public-interest RD&D activities as those that advance science or technology and are not adequately provided for by the competitive and regulated markets. Senate Bill 90 (Chapter

905, Statutes of 1997) created the Public Interest Energy Research (PIER) program to improve energy production, generation and end-use technologies under established performance criteria that include environmental, economic and social benefits.

PIER – Upholding California's commitment to technology advancement, the PIER program will consist of a balanced portfolio that addresses California's energy and environmental needs, technology opportunities, and system reliability. To achieve balance, the portfolio will include the subject areas of environmental enhancements, enduse efficiency, environmentally-preferred advanced generation, renewable technologies and other strategic energy research, including system reliability RD&D. During the transition period, the Energy Commission will target approximately \$62 million annually on these five RD&D subject areas. (Energy Commission, June 1997) The state must consider what its role in RD&D will be beyond the transition period.





New technologies are allowing access to alternative fuels and improving the State's environment.

LONG-TERM EFFORTS – Public-interest RD&D needs to be sufficiently connected to the market so that successful RD&D projects yield commercially viable products and services while depending on private entities to bring these products to the market. Clear, measurable criteria will be needed to track progress and offer citizens credible information about research and development, ensuring accountability. These principles apply not only to AB 1890-related RD&D but all publicly funded energy RD&D. When deciding the most effective use of public dollars, state government must maintain a long-term outlook that considers the energy and environmental needs of all Californians now and in the future.

ISSUES/NEEDS

- How can public purpose and private RD&D be coordinated and developed in a complementary manner?
- Beyond the transition period, what will be government's role in RD&D? How will the costs of the programs be allocated?
- To what measure of success should future public purpose RD&D projects be held?

POLICY: Facilitate research, development and demonstration of energy-related processes, products and services that improve the quality of life for California's citizens by providing environmentally sound, safe, reliable and affordable energy services and products.

- Provide public funding for public-interest, energy-related RD&D and demonstrate a balance of benefits to all sectors that contribute to the funding.
- Develop performance criteria for RD&D programs that are based on environmental, system reliability, economic and social benefits. Where possible, quantify energy saved, cost savings and value of environmental improvements.
- Implement the AB 1890 RD&D Program. By 2002, complete
 the program's integration and coordination with other statesponsored energy-related RD&D, continuing the research
 initiated by AB 1890 beyond the transition period.
- Use public-private partnerships to increase funding levels whenever possible.
- Determine barriers to commercialization of new, advanced energy-related technologies, processes and services, and identify potential strategies that reduce or eliminate these barriers.
- Fund RD&D for transportation technology and fuel options that reduce adverse environmental consequences and congestion, and improve vehicle efficiency.
- Demonstrate energy technologies and strategies that improve environmental quality.

MAJOR PERSISTENT TRANSPORTATION

ISSUES ARE ADVERSE ENVIRONMENTAL

IMPACTS, CONGESTION, AND RELIABLE FUEL

SUPPLY AND PRICE STABILITY.



TRANSPORTATION

DOMINANT SHARE – Transportation consumes nearly half of all the energy used in the state, is almost exclusively fueled by petroleum products, and is the single greatest source of the emissions that make smog (namely, reactive organic gases and nitrogen oxides). Major persistent transportation issues are adverse environmental impacts, congestion, and reliable fuel supply and price stability. To address these problems, public and private entities have investigated new fuel formulations, mass transit options, more fuel efficient engines and other viable alternatives that improve Californian's mobility.

DIRECTIONS – In 1991, the California Transportation Directions Policy Committee published the *California Transportation Directions: Mobility for 2010*. This project brought together a diverse group of participants to develop goals and strategies needed to address California's future transportation requirements.

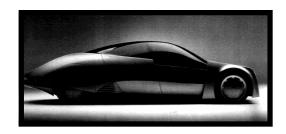
Also in 1991, under Senate Bill 1214 (Chapter 900, Statutes of 1991), the Legislature and Governor directed the Air Resources Board, the Department of Transportation and the Energy Commission to examine various scenarios to

determine the best approach to resolving the state's transportation problems.

Preliminary findings of the resulting work include:

- Costs to the environment and society are not fully reflected in the price paid at the pump.
- Regional transportation strategies are needed for a least-cost approach to resolving issues.
- California should take action to address federal policy affecting petroleum demand.
- The amount and distance people drive is the source of most of the social costs of transportation. (Energy Commission, February 1994)

Work initiated to implement *California Transportation Directions* and under Senate Bill 1214 needs to continue. Examining the progress made through these programs and studying the lessons learned in the last six years are vital to finding solutions to the state's stubborn transportation challenges.



Ford Motor Company's Synergy 2010 is a concept car that explores futuristic technology and design ideas.

FUTURE STRATEGIES – California must pursue new, innovative methods to resolve transportation-related issues. State policies and strategies must incorporate the relationships between taxation, land use planning, vehicle miles traveled, infrastructure financing, environmental programs, energy supply availability and cost, and technology options. Regional and local agencies must be brought into any state effort to develop solutions because of the intricate relationship between land use and transportation impacts.

Future transportation technologies (i.e., fuel cells, hybrids, electric vehicles, improved mass transit) hold the promise of reducing per capita petroleum consumption and minimizing adverse environmental impacts. To provide greater transportation fuel options, state government needs to require that all fuels meet the same health and environmental standards and are taxed equitably to achieve fuel neutrality. For fuel and vehicle alternatives, government will work with industry and the public to provide adequate infrastructure and supportive subsystems.

ISSUES/NEEDS

- How can government more effectively achieve the state's mobility goals, while improving the economy and environment?
- How can California better coordinate public/private partnerships to reduce transportation congestion?
- What can government appropriately do to bring cleaner, more efficient transportation technologies to consumers?

POLICY: Assist in the transformation of the transportation system to improve air quality, reduce congestion and increase the efficient use of fuel supplies with the least environmental and energy costs.

- Under the direction of Department of Transportation, complete the current update of the California State
 Transportation Plan by December 31, 1998, to respond to the state's future transportation needs and issues.
- Study the potential for reducing highway congestion through timely system maintenance to improve operational efficiency, traffic management, automatic vehicle control technology and variable toll highway facilities.
- Encourage private industry to establish sufficient refueling stations for cost-effective alternative transportation fuel use.
- Provide assistance to local jurisdictions for land use planning that minimizes transportation related energy needs and includes efficient public transportation. Encourage urban designs that reduce vehicle miles traveled, and accommodates pedestrian and bicycle access.
- Support federal and state actions to establish tax policies
 that are fuel neutral and hold all fuels to the same
 environmental standards to facilitate fair, balanced
 competition among competing transportation fuels and
 technologies.
- Work with industry and researchers to support the development of engines and other technologies that at least double the current level of efficiency.
- Assist public agencies and fleet operators in implementing incentive programs for zero-emission vehicles, or their equivalent, and address infrastructure needs.
- Provide consumer education and information on fuel and technology choices.

". . . REDUCE THE SIZE OF GOVERNMENT

AND CONFORM REGULATORY PRACTICES

TO THE MARKET REALITIES."

1995-96 Governor's Budget Summary



GOVERNMENTAL ORGANIZATION AND EFFECTIVENESS

STREAMLINE – Over the last decade, the Administration and the Legislature have made several proposals to improve the effectiveness of government, particularly in the energy oversight and regulatory structure. The Wilson administration has established itself as a force for streamlining government and reducing costs to taxpayers and businesses. The Governor's reorganization proposals for the state's energy functions have sought to eliminate waste, consolidate like-functions, reduce costs and improve services to California taxpayers.

TIMES HAVE CHANGED – State energy oversight was created more than 20 years ago under different market conditions. Since then, legislative changes have allowed markets to evolve. The state benefited from new technologies, improved energy efficiency and a more diverse supply. Nevertheless, government has been slow to adapt itself to these changing circumstances. Not only must government reduce its regulatory controls, it must also become more efficient and effective by streamlining processes and consolidating programs.

TIMING – The time is ripe to reorganize and consolidate the energy functions of the state. As the state reconsiders its role in the emerging new electricity market, it has the opportunity now to improve its processes and programs to better fit energy markets and respond to citizens' needs.

BOLD APPROACH – The Governor and the Legislature need to examine current law and policies to determine how best to consolidate the state's energy functions into a single energy agency that has primary, comprehensive responsibility for all state level energy-related oversight. Throughout this legislative process, public participation will be needed to better understand how to modify state programs to improve services. Part of this reform needs to include formal agreements among the consolidated agency and single purpose agencies to ensure a unified regulatory structure that crosses jurisdictional boundaries. In this manner, government services can be provided while avoiding unnecessary public costs.



State energy programs must evolve to become more efficient and effective.

ISSUES/NEEDS

- How can government improve the effectiveness and responsiveness of its oversight function in a competitive market setting?
- As government's regulatory role diminishes in the electricity industry, how can it still provide adequate oversight for consumer and environmental protection?

POLICY: Establish a unified energy policy and integrated regulatory environment that permits flexibility, encourages innovation and responds to energy issues and needs in a timely manner.

- Revise existing law to consolidate the state's energy-related functions into a single state energy agency. Remove waste, redundancies and inefficiency, while improving services in the areas of reliable energy supply, and consumer and environmental protection. Consider merging existing state energy activities, including energy facility siting and compliance monitoring, policy development, rate making, information services, conservation and efficiency, and RD&D in this single agency.
- Establish Memoranda of Understanding between the new consolidated energy agency and other agencies (i.e., California Department of Transportation, California Environmental Protection Agency, Federal Energy Regulatory Commission, etc.) to implement integrated policies and ensure coordination.
- Work with interstate, regional, local and international organizations to further develop a system-wide approach which enhances reliability of energy supply and distribution.
- Improve access to state proceedings to provide greater opportunities for public participation in energy policy development, market oversight and remaining ratesetting functions.







CALIFORNIA IS RESTRUCTURING

ITS ELECTRICITY INDUSTRY TO

ALLOW RETAIL COMPETITION IN

ELECTRICITY SERVICES.

CALIFORNIA AT THE CROSSROAD

California stands at the crossroads where the energy industry makes a distinct change. This change results from more than two decades of evolving policies and regulations toward competitive supplies of oil, natural gas, alternative resources and wholesale electricity. Continuing this evolution, California is restructuring its electricity industry to allow retail competition in electricity services.

Society once considered monopolies necessary to protect consumers from high prices and unreliable energy supplies. Now, monopolies are giving way to competition and the demand to be more responsive to the needs and choices of energy customers. At this crossroads, California must now determine how best to modify the state's governance structure to oversee most effectively and responsively the increasingly competitive and integrated energy sector.

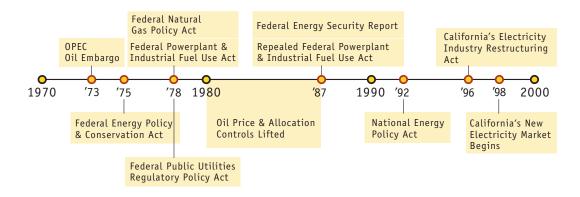
THE ROAD TO COMPETITIVE MARKETS

Challenges posed by the oil crises of the 1970s prompted Congress to change laws regulating the energy market. These changes brought increased competition, innovations and alternatives that challenged long established energy systems and technologies. In addition, conservation and efficiency efforts were instituted to reduce the growth rate of energy demand and to offset supply problems.

Some of the major legislative changes illustrating the evolution of the energy markets include:

- The 1975 Energy Policy and Conservation Act which not only sought to increase domestic production of oil, but also instituted conservation efforts and the Corporate Average Fuel Economy standards that required personal vehicles to attain 18 miles per gallon in 1978 and 27.5 mpg by 1985.
- The 1978 Federal Public Utilities Regulatory Policies
 Act (PURPA) requires utilities to purchase power from
 non-utility electricity generators that use renewable
 resources or cogeneration technology to promote
 competition among electricity generators.

LEGISLATIVE EVOLUTION OF ENERGY MARKETS



- PURPA also expanded federal efforts in appliance and building energy efficiency.
- The Federal Powerplant and Industrial Fuel Use Act of 1978, which placed restrictions on burning natural gas in power plants, was repealed in 1987.
- The Natural Gas Policy Act of 1978 phased out gas wellhead price controls, thereby initiating restructuring and partial deregulation of the natural gas industry.
- Oil price and allocation controls were lifted in the early 1980s.
- In the mid-1980s the federal Energy Security Report embraced greater trade and cooperation in world energy markets. (Department Of Energy, 1987)
- The National Energy Policy Act of 1992 created a new class of non-utility generators that can operate in the wholesale electricity market and also enhances the Federal Energy Regulatory Commission's authority to ensure these companies have access to the transmission system.

CALIFORNIA'S ENERGY MARKETS

California is a front-runner in the movement to more competitive energy markets. The state's strong commitment to implement PURPA resulted in an electricity system powered by a diverse mix of resources. Approximately 15 percent of California's electrical capacity is owned and operated by non-utility companies. (Energy Commission, November 1995) In the 1980s, California advocated that investors, rather than regulatory authorities, should decide which, if any, natural gas pipelines should be built. Consequently, market forces resulted in increases of interstate pipeline capacity, providing California access to more ample natural gas supplies. This resulted in lower costs for natural gas and substantial savings for California customers.

California's conservation and efficiency policies then evolved from a "use less" philosophy into a "doing more with less" reality. State programs moved from prescriptive mandates to more flexible approaches for meeting minimum standards. Today programs are focused on identifying and providing value to customers, such as lowering costs and improving operations.

Fostering technology advancements, California's energy policies and public dollars supported the development of more efficient homes and appliances, less polluting vehicles, distributed generation and renewable technologies.

ELECTRICITY INDUSTRY RESTRUCTURING

Consistent with the state's goal of increased competition in all energy markets, California has boldly embraced the restructuring of the state's electricity market. With the passage of Assembly Bill 1890 (Chapter 854, Statutes of 1996) in 1996, the California Legislature declared its intent "to ensure that California's transition to a more competitive electricity market structure allows citizens and business to achieve the economic benefits of industry restructuring at the earliest possible date, creates a new market structure that provides assurances that electricity customers in the new market will have sufficient information and protection, and preserves California's commitment to developing diverse, environmentally sensitive electricity resources." [Section 1(a)]

Introducing competition in an industry dominated by monopolistic utilities is a challenging task. Relationships between customers and service providers will evolve as consumers face a variety of new choices. If implemented properly, industry restructuring can lead to lower rates, greater energy efficiency and more options from which to choose.

AB 1890 allows customers of existing investor-owned utilities to purchase electric generation in one of three basic ways by January 1, 1998:

- Continue to purchase all electricity services from their current utility.
- 2. Continue to purchase electricity from their current utility as above, but may also enter into "contracts for differences" (financial hedging instrument) with nonutility generators, marketers, energy services providers or other willing parties.
- **3.** Purchase electricity directly from non-utility generators, marketers or other energy services provider by entering into "direct access" contracts.

Within these three basic options, utilities and other energy services providers are expected to offer a broad range of services at competitive rates. These will include real-time and time-of-use rate options and various value-added services.

AB 1890 is designed to allow competition for generation supply. Transmission and distribution will remain monopoly services. The rates for these services will continue to be regulated by FERC and the CPUC or publicly-owned utility boards, respectively. The CPUC is unbundling additional energy-related products and services, such as metering and billing, that can be offered competitively in the near future.

AB 1890 creates three new energy-related entities. First, the Independent System Operator (ISO) will coordinate the daily scheduling and generation dispatch activities of all market participants. It will have operation control of the investor-owned utilities' (IOU) transmission systems (publicly-owned utilities may join the ISO at their option) and is responsible for the reliability of the state's transmission system.

"OVER THE LAST 20 YEARS, policy makers have charted a course towards competition among utility providers, allowing whenever possible, for market forces to replace government regulation," said (Little Hoover) Commission Chairman Richard Terzian. "But the promised benefits of competition – lower prices, better service, more choices among providers – may not be reaped unless California restructures the government agencies that have historically regulated these industries." (December 10, 1996).

Secondly, the Power Exchange (PX) will provide a competitive, open auction for electricity buyers and sellers much like a commodities market. Finally, the Electricity Oversight Board will have oversight responsibility of the ISO and PX.

In addition, the statute provides IOUs with the opportunity to recover their "stranded" costs, i.e., costs for past investments in existing power plants that will not generate electricity at competitive prices. Most customers of the investor-owned utilities will be required to pay a non-bypassable competition transition charge (CTC) designed to cover these costs.

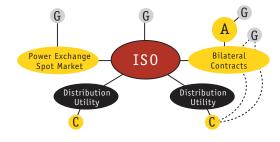
AB 1890 imposes a rate freeze for IOU electricity customers at the level of June 10, 1996 rates, except for residential and small commercial customers who will receive a ten percent rate reduction. This rate reduction will be financed through rate reduction bonds paid for by customers that benefit from the reduction.

AB 1890 also authorizes the collection of funds from ratepayers to support public purpose programs (e.g., energy efficiency, public-interest research and development, low-income support programs and renewable power generation) during the transition period from 1998 to 2002. Each of these elements (i.e., generation, transmission, distribution, public purpose surcharge and the CTC) will appear separately on customers' bills, in contrast to the all-inclusive, single rate electricity customers pay today.

The state's publicly-owned utilities (POUs), however, are not obliged under AB 1890 to open their service territories to competitive suppliers. Instead, AB 1890 requires POUs to conduct public hearings on the subject to determine whether to open their markets. Any POU that declines to allow competition within a time specified by the act, will not be allowed to impose a transition charge. It is anticipated that the largest POUs will effect to allow their customers to choose their electricity supplier. Notwithstanding, a POU's election to open their service area to competition, AB 1890 requires each POU to establish a non-bypassable usage charge to fund public purpose programs.

For more information regarding electricity restructuring, please refer to the Energy Commission's Electricity Report, August 1997 or contact the Electric Education Call Center. Questions regarding energy efficiency, renewable energy and RD&D can be referred to the Energy Commission (1-800-555-7794).

CALIFORNIA'S NEW ELECTRICITY MARKET STRUCTURE



G GENERATORS

Sell to Exchange, contract with customer, contract with aggregator

A AGGREGATORS

Bring groups of customers together

C CUSTOMERS

Buy from: Utility, Aggregator, Generator

CALIFORNIA'S ENERGY OUTLOOK

As the population and the economy grow, so does the amount of energy used in the state. Although California produces much of the energy it uses, it relies on many out-of-state resources to meet its total energy demand (Figure 1).

Over the last two decades, however, California has slowed the rate of growth for energy use without hindering the growth rate for the gross state product (Figure 2).

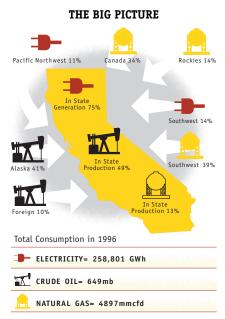


FIGURE 1 – Source: California Energy Commission, Department of Conservation, and Federal Energy Regulatory Commission.

OIL - THE GLOBAL MARKETPLACE

Current forecasts of the future world oil market predict stable or gradually increasing oil prices during the next two decades. Several major uncertainties surround such forecasts: growing oil demand in developing and industrializing countries; concentration of world oil reserves in the politically unstable Middle East; and declining domestic oil production. The federal Energy Information Administration (EIA) predicted in December 1996 that crude oil prices will gradually rise to \$21 a barrel by 2015 in constant 1995 dollars (\$39 in nominal dollars). (EIA, December 1996)

Growth in world oil demand will be heavily influenced by developing countries because of increased industrialization. The United States Department of Energy (DOE) expects oil consumption in developing countries to increase from 21.4 million barrels per day in 1995 to 42.7 million barrels per day in 2015. (EIA, April 1997)

According to Chevron, the world's currently abundant production of oil is expected to continue for several decades. (Haley, 1996) OPEC countries, having the largest known reserves, are expected to regain their dominant role as oil producer for the world after production in other parts of the world begins to decline. Domestic oil production shows a continued slow decline in California and Alaska. (International Energy Agency, 1996) As a result, California will need to increase its import of foreign oil above today's current level of ten percent or will need to import refined product. (Energy Commission, December 1995)

ABUNDANT NATURAL GAS

Direct uses, electric generation and transportation will affect California's demand growth rates for natural gas. By 2015, California is expected to increase its consumption of natural gas by 1,500 million cubic feet a day or 23 percent. (Energy Commission, December 1995) New power plants are likely to be fueled by natural gas because of economic and environmental benefits. In many cases, these new efficient plants will replace power plants that use as much as twice the fuel-equivalent per kilowatt-hour generated. (Gas Turbine World, 1996)

As the natural gas market continues to evolve and service options expand, customers may increase their use of natural gas for such things as space and water heating. In addition, natural gas is a viable alternative to petroleum for use in cars, trucks and buses. Transportation-related demand growth will occur with broader acceptance of this alternative and the development of a safe, reliable refueling infrastructure.

One third of energy commodities consumed in California is natural gas, second only to oil. (Borg, 1996) It will remain a major affordably priced energy source for California during the next 20 years (Figure 3) and most likely beyond.

Recent estimates of the North American gas reserves indicate much larger reserves due to improvements in both exploration techniques and reserve development. The Energy Commission estimates a total resource base (gas recoverable with today's technology) for the lower 48 states to be more than 1,000 trillion cubic feet (tcf), enough to satisfy current production levels for the next 60 years. (Energy Commission, December 1995) Future natural gas supplies will not only come from California, but also the Rocky Mountain region, Southwest sources and Canada (Figure 4).

THE ENERGY CONSUMPTION

Percent Growth of Population, Gross State Product and Energy Consumption Base Year: 1975

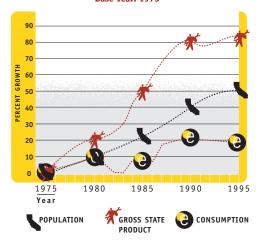


FIGURE 2 – Source: California Department of Commerce, California Department of Finance, and Energy Information Administration.

FORECAST NATURAL GAS PRICES FOR CALIFORNIA CUSTOMERS

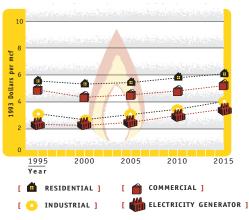


FIGURE 3 – Source: Energy Commission 1995 Natural Gas Market Outlook

FUTURE SOURCES OF CALIFORNIA'S NATURAL GAS

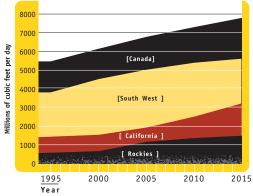


FIGURE 4 - Source: Energy Commission 1995 Natural Gas Market Outlook

FUTURE ELECTRICITY DEMANDS

Annual growth rates for electricity demand in California will decline over the next 20 years to 1.63 percent from 2.21 percent annually according to the Energy Commission. Through conservation and efficiency achievements, California already has one of the lowest per capita consumption rates in the country (Figure 5). Per capita peak consumption is expected to grow slightly by 2015 to approximately 7525 kWh a year (Figure 6).

Despite high electricity rates (on average, California's rates are now 50 percent higher than the national average), low per capita use has resulted in Californians having among the lowest average household electricity bills in the country.

By 2015, total statewide peak demand is expected to reach approximately 68,100 MW or 325,000 GWhr for the state, up only 29 percent over 20 years.

Current electricity supplies substantially exceed today's demand. As supply and demand converge, the Energy Commission anticipates there will be adequate economic incentives in the new electricity market to attract new power plant investment. The Energy Commission anticipates new capacity will be needed soon after the turn of the century — as much as 6,700 MW by 2007. To some degree, renewable and distributed generation may

offer options to meet a portion of this demand as these technologies become cost-competitive with conventional technologies.

Competition among electricity providers is expected to lower the price of power or to increase the value and range of energy-related services. The Energy Commission estimates that in the near-term the commodity cost of power will range between 2 and 2.4 cents per kWh depending on a variety of factors. The impact on small or residential customer's overall bill, however, will not be significant because generation is only a portion of the total rate paid.

ENERGY ALTERNATIVES

Competition allows the market to decide the mix of resource options available to consumers. State agencies working with private companies can lower institutional and regulatory barriers to alternative resources and technologies. Changes in tax policies to ensure fuel neutral and fair treatment of all fuels can be a part of this strategy. To better understand fuel choices, fuel cycle analysis can assist in the evaluation of fuel options based on environmental impacts.

California, however, must consider the costs to create new or flexible fuel infrastructures to support new alternative fuel delivery systems, particularly for personal transportation. Alternative fuels will not be viable unless they are readily available and competitively priced.

GLOBAL CLIMATE CHANGE

A widely debated and studied impact of energy development and use is global climate change, the gradual alteration of atmospheric conditions attributed to manmade forces. Predicting accurately the exact impacts of increased greenhouse gases or other air pollutants in the Earth's atmosphere is nearly impossible. However, the

impacts suggested by current research have caught the attention of many individuals, organizations and governments.

By its very nature, global climate change requires international cooperation to define the problem and causes, and to implement a solution. Negotiations on an international agreement on greenhouse gas controls have occurred under the auspices of the United Nations since 1992. An agreement was reached in Kyoto, Japan in December, 1997 that, if ratified by enough countries to become effective, would provide for most industrialized countries to reduce human-produced greenhouse gas emissions (referring to carbon dioxide, methane and nitrous oxide).

The U.S. would reduce emissions by seven percent, European nations by eight percent, and Japan by six percent from 1990 levels by an unspecified time between 2008 and 2012. A further international negotiating session is scheduled for November 1998 in Buenos Aires to address the participation of developing countries in greenhouse gas emission controls.

California recognized the potential significance of global climate change in 1988, when the Legislature directed the Energy Commission to study its possible effects. The Energy Commission produced reports in 1991 and 1997, evaluating global climate change issues, policies and strategies. The Energy Commission continues to inventory and evaluate emissions of greenhouse gases in all sectors of the economy, to develop strategies that could be effective in reducing emissions or mitigating impacts and to monitor national and international actions and events regarding these issues.

California's actions over the past two decades to promote energy efficiency, renewable energy resources, and cleaner vehicles and fuels have helped reduce greenhouse gas emissions. These actions, together with a mild climate and lower concentrations of energy-intensive industry than the nation as a whole, have resulted in per capita emissions of greenhouse gases in California more than 40 percent below the national average.

CONSUMPTION AND PRICE California vs. United States

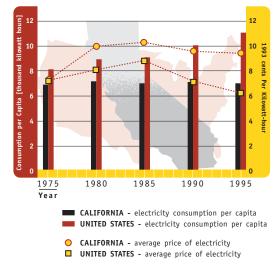


FIGURE 5 - Source: Energy Commission

CALIFORNIA'S FUTURE ELECTRICITY CONSUMPTION

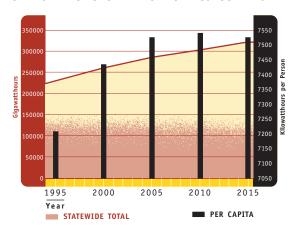


FIGURE 6 – Source: Energy Information Administration

CALIFORNIA'S TRANSPORTATION CHALLENGES

About half of all the energy used in California is for transportation (Figure 7). California's current modes of transportation are almost exclusively fueled by petroleum products. Persistent problems facing the state's transportation sector include: 1) air quality, 2) congestion and 3) reliable supplies and price stability.

CLEANER FUELS

In 1992, California implemented specifications for California reformulated gasoline (Phase 1 RFG). These specifications banned the use of lead in gasoline, required the addition of deposit control additives to gasoline, and restricted the volatility of gasoline. This resulted in the reduction by 14 percent of emissions of volatile organic compounds which are ozone precursors. In 1993, new standards for diesel fuel reduced particulate emissions by an estimated 25 percent and nitrogen oxides emissions by seven percent.

As of June 1996, gasoline sold in the state meets the California Air Resources Board's "clean-burning gasoline" specifications (Phase 2 RFG). California's RFG reduces the emissions of ozone precursors (volatile organic gases and nitrogen oxides) by 15 percent, the equivalent of removing

the emissions from 3.5 million vehicles from California's air. RFG, and implementation of increasingly stringent vehicle emissions standards, will result in significant reductions in vehicle exhaust emissions over the next several years (Figure 8). California supports the goal of a national standard for all transportation fuels, as long as those standards are as effective as California's.

LAND USE PLANNING

Local land use policies have received greater attention in recent years because of their relationship with transportation issues such as congestion. Current projections indicate that, without further action, there will be a significant increase in the number of miles Californians travel (Figure 9). Urban design that locates jobs, services and housing in close proximity can reduce the daily miles traveled.

New planning tools, such as PLACE'S (see next page) can help plan more energy-effective communities. Regional transportation planning models compare long-term effects of land uses and transportation choices on vehicle trip generation. They can also provide life cycle analysis of actual costs (both social and economic). As these tools are refined, they will help local government evaluate and implement better solutions to transportation issues.

RELIABLE FUEL SUPPLIES

California's new reformulated transportation fuels are subject to the same supply disruptions and price increases that affect all major energy resources in the state. Even with California's unique fuel regulations, some refiners outside California can and will produce some complying gasoline and diesel for export to the state if the price is

right. Importing fuels to California is an option when the price differential is sufficient to cover the additional transportation and refining costs.

Fuel efficiency in the transportation sector can slow the demand growth for petroleum products and also help reduce the emissions of carbon dioxide, a greenhouse gas. Current high demand for sport utility vehicles and small trucks in place of automobiles is reversing the trend toward greater vehicle efficiency. Yet improved efficiency of the transportation sector remains essential for minimizing costs to the consumer whether at the pump or in environmental clean-up.

PLACE3S

The density, mix and relationship of land uses heavily influence the amount and mode of travel and, as a result, the amount of energy needed for transportation. Since local governments have primary authority over how land is used, the Energy Commission is working with city, county and regional governments to use the PLACE3S method of energy efficient community planning. This land use and urban design method assists local agencies to evaluate individual land use and development proposals and to assess long range growth. It provides maps and focused data to educate the public and decision makers about the impacts of their land use decisions. The outcome is a better informed and inclusive public process which balances community values with energy, environmental, economic and social issues. For more information, please contact the Energy Facilities Siting and Environmental Protection Division, California Energy Commission, at (916) 654-3924.

ENERGY USE BY SECTOR/1995

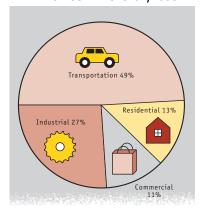


FIGURE 7 - Source: California Energy Commission

PREDICTED CALIFORNIA VEHICLE EXHAUST EMISSIONS

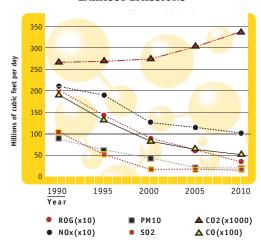


FIGURE 8 -Source: California Air Resources Board, Ozone Planning Inventory

CALIFORNIA ON-ROAD DEMAND

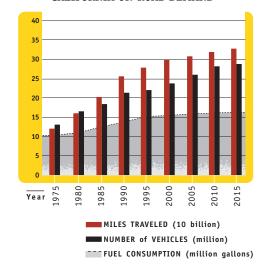


FIGURE 9 – Source: California Energy Commission

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CALIFORNIA ENERGY COMMISSION

William J. Keese, Chairman
David A. Rohy, PhD, Vice Chair
Jananne Sharpless, Commissioner
Michael C. Moore, Commissioner
Robert A. Laurie. Commissioner

STATE ENERGY PLAN COMMITTEE

David A. Rohy, PhD, Vice Chair and Presiding Member Michal C. Moore, Commissioner and Associate Member

STATE ENERGY PLAN COMMITTEE ADVISORS

Manuel Alvarez
Susan Bakker
Bob Eller
Celia Howell
Tom Tanton

EXECUTIVE OFFICE

Stephen Rhoads, Executive Director Kent Smith, Chief Deputy Director

Project ManagerLorraine White

Staff Counsel

Sidney Mannheim Jubien

Principle Staff Authors

Celia Howell

Sidney Mannheim Jubien

Lorraine White

Editorial Consultant

Renee Parvis

Staff Contributors

Larry Baird, Susan Brown, Bruce Ceniceros, Claudia Chandler,
Nancy Deller, Faustino Flores, Sy Goldstone, Jackie Goodwin,
Andrea Gough, Janet Gregory, Bob Grow, Alec Jenkins, Sue Kateley,
Bill Knox, Ken Koyama, Ron Kukulka, Pramod Kulkarni,
Chuck Mizutani, Gina Morthole, Bill Pennington, Ann Peterson,

Heather Raitt, Dennis Smith, Mike Smith, Leigh Stamets, Kate Sullivan, Jonathan Teague, Scott Tomashefsky,

Karen Van Egdon, Ken Wilcox, Bill Wood, Kate Zocchetti

Photo Contributions

Ford Motor Company (p.3, 17), California Independent System Operator (p.11), California Power Exchange (p.7).

Participants

The Energy Commission appreciates the contributions of the following

participants in the State Energy Plan proceeding:

Donald Aitken, Union of Concerned Scientists

Thomas Artushin, Ford Motor Company

Robert Bradley, Institute for Energy Research

Dale Brogan, Delano Irrigation District

California Air Resources Board

California Department of Conservation

California Department of Transportation

California Environmental Protection Agency

California Public Utilities Commission

California Resources Agency

Henry Courtright, Electric Power Research Institute

Environmental Education, Tides Foundation

George Franck, SANDAG

William George, Ford Motor Company

Geothermal Energy Association

Kenneth Green, Reason Foundation

Kenneth Haley, Chevron Corporation

Mary Himes, California Department of Finance

Mike Hodgson, California Building Industry Association

Drake Johnson, Energy Consultant

Marvin Liebermann, Electric Power Research Institute

Tom Lieser, UCLA Business Forecast Project
Amory Lovins, Rocky Mountain Institute
Robert Michaels, Institute for Energy Research
Peter Miller, Natural Resources Defense Council

Pacific Gas & Electric

Margaret Pryatel, ITER Project

Robert Raymer, California Building Industry Association

Maurice Sabado, *ITER Project*San Diego Gas & Electric

Peter Schwartz, Global Business Network

Southern California Edison

Alan Sweedler, San Diego State University Emilio E. Varanini, Marron, Reid & Sheehy

Robert McWhinney, International Resources Group

Carl Weinberg, Energy Consultant

V. John White, Center for Energy Efficiency & Renewable Technology, and Sierra Club